THE ECHINODERMS OF CEYLON OTHER THAN HOLOTHURIANS.

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THROUGH the kindness of Dr. Pearson a collection of echinoderms belonging to the Colombo Museum was sent to me for examination in the Spring of 1914. There were no holothurians, but the other classes were well represented by ten species of crinoids, fifteen species of starfishes, eight species of brittle-stars, and twenty-two species of echini. Of these, one crinoid and one starfish seemed to be new to science. There were no data with any of the specimens, but all were from Ceylon. Many were taken on the pearl banks.

The first notice of the echinoderms of Ceylon is that published by Bell (1882), listing nineteen species from Point de Galle. There were no holothurians; and the single crinoid, one starfish, and one brittle-star were not identifiable. Three years later Walter (1885) reported on the echinoderms which Haeckel had collected in Ceylon, but (aside from holothurians) there were only fourteen species, and of one of these the identification was not complete. Nevertheless, eight of the species were additions to Bell's list. In 1887 Bell published a revised list of the echinoderms of Ceylon, in which he entered forty identified species, aside from holothurians. The following year Döderlein (1888), reporting on the Sarasins' collection, added twenty-three starfishes, brittle-stars, and sea-urchins to the list. In 1890 Ludwig added three more brittle-stars, besides an unidentified amphiurid. Four years later Thurston (1894), in "Notes on the Fauna of the Gulf of Mannar," gives eight additional species, and subsequent writers in scattered notes have listed a number of species. At the time of the

investigation of the Ceylon pearl fisheries by Herdman in 1902, therefore, not fewer than seventy-five well-authenticated species of echinoderms, other than holothurians, were recorded from the shores of Ceylon. Herdman's collections brought this number up to one hundred and ten at least, of which fifteen are crinoids, thirty-five starfishes, twenty-five brittle-stars, and thirty-five echini. Still more recently the reports on the echinoderms in the Indian Museum at Calcutta have lengthened the list, Koehler adding four starfishes and nine brittle-stars, while A. H. Clark adds seven comatulids. A few species have also been added in other Papers by various writers, so that the recorded echinoderm fauna of the shores of Ceylon, excluding holothurians, and allowing for cases where the same species is probably listed under two different names, is about one hundred and thirty. The collection before me from Colombo adds three crinoids, four starfishes, two brittle-stars, and one sea-urchin. Following the list of specimens from the Colombo Museum, I give a revised list of the littoral echinoderms of Ceylon, so far as it is known at this time (August, 1914), excepting the holothurians. I have ignored this interesting class, because Dr. Pearson is himself engaged in preparing a complete account of its representatives in Ceylon.

List of Echinoderms from Ceylon in the Colombo Museum.

1. *Comanthus* annulatum* (Bell).—A number of specimens (22) having from 40 to 54 arms. The division series are nearly always 4 (3 + 4).
2. *Comanthus parvicirrum* (J. Müller).—One small specimen with 21 arms.
3. *Comanthus samoanum*, A. H. C.—One specimen with 25 arms and 24 cirri, having 15–17 joints.
4. *Comanthus schlegelii* (P. H. C.).—Two specimens, one of which has about 120 arms.

* The Greek noun on which this word is based is neuter, hence specific names ought to use a neuter ending.

5. *Heterometra reynaudii* (J. Müller).—Fifty-five specimens, three of which are noticeably larger and with longer arms than the rest.
6. *Dichrometra protecta* (Ltk.).—Two specimens.
7. *Dichrometra tenera* (Hartl.).—One fine specimen with 40 arms and the cirri XL., 22-25.
8. *Cenometra herdmani*, A. H. C.—A calyx with the cirri and 2 arm-bases attached. In A. H. Clark's "Crinoids of the Indian Ocean," on p. 154, are given figures of a cirrus of this species, labelled "Cenometra insueta," while on p. 156 similar figures of a cirrus of that species are labelled "Cenometra herdmani." Mr. Clark's description of the difference between the two species is correct; he tells me that the labels on these figures have been unfortunately interchanged.
9. *Tropiometra encrinus*, A. H. C.—Two characteristic specimens.
10. *Tropiometra indica*, A. H. C.

Cirri XXV., 22, 23, about 20 mm. long; middle and distal joints 1 mm. long, 1 mm. wide, and 1·5–1·75 mm. thick. Centrodorsal 7–8 mm. across, thick and discoidal, with cirri in one, and a partial second, row. Brachials very low, less than a millimeter thick (longitudinally), even when the distal margin measures 4·5 mm.; near base of arm there are 14 brachials (including two syzygial joints) in a centimeter; beyond middle there are 18 or 19 brachials (including two syzygial joints) to a centimeter. Distal margin of basal brachials very uneven and irregular, slightly flaring, not at all serrate or spiny; there are at least three evident projections, the largest near the base of the pinnule, but separated from it by a re-entrant curve, the smallest on the other side of the brachial and the third median in position. This third projection becomes increasingly conspicuous on each succeeding brachial, until at the middle of the arm it is a rough projecting knot or rounded tooth. Distally it gradually decreases in size and disappears. Pinnules

much as in *T. encrinus*, but the two basal joints of the middle pinnules are conspicuously larger than the succeeding joints, and rather abruptly so ; these two joints are much wider than high. Arms stout at base, rather abruptly attenuate from near middle, probably about 60 mm. long, but none is complete. Colour, light brownish-white, without markings of any sort.

Comparison of the single specimen on which the above description is based with typical specimens of *carinata* and *encrinus* shows it is neither of those species. Nor does it seem to be any nearer *indica*, so far as Mr. Clark's fragmentary references to that species show ; but as he has examined the specimen and assures me it is *indica*, I have refrained from giving it another name. I have decided, however, to let the description I had drawn up stand. There are no data with the specimen.

11. *Astropecten andersoni*, Sladen.—One small specimen.
12. *Astropecten indicus*, Döderlein.—Four small specimens.
13. *Astropecten mauritianus*, Gray.—Five medium-sized and large specimens.
14. *Astropecten zebra*, Sladen.—Two small specimens. I agree with Bell that *zebra* is only a name for the young of some previously described astropecten, but I am not as yet prepared to assert which one.
15. *Luidia maculata*, M. & T.—Nine specimens, ranging from very small to very large ; the smallest and three others have 8 arms each ; the remaining five, including the three largest, have 7.
16. *Siraster tuberculatus*, gen. et sp. nov.

Generic diagnosis : Body stellate ; disk flattened, without secondary plates ; primary plates not concealed by skin ; medioradial plates reaching to terminal plate of arm ; entire abactinal surface granulated ; papulæ single, distinct, each pore surrounded by a few granules, obviously larger than those covering the neighbouring plates. Inferomarginal plates without conspicuous spines, but those beyond middle of arm, each with a low tubercle or flattened tubercle-like spine on

upper distal surface. Adambulacral armature much as in Stellaster, with a conspicuous, flattened, blunt spine on actinal surface. (Name from σιρός, *a pit in the ground for storing corn* + ἀστήρ, *a star ;* in reference to the papular pores surrounded by conspicuous granules.) Genotype—*S. tuberculatus*, sp. nov.

It is with much diffidence that I add a new genus to the perplexing family Goinasteridæ, but I cannot otherwise dispose of the present species and Studer's *Stellaster squamulosus*. That the two are congeneric will not, I think, be questioned ; that they cannot properly be placed in Stellaster seems to me equally true. Neither has the plates concealed by skin, although *squamulosus* is nearer true Stellaster in this respect than is *tuberculatus*. More important is the fact that neither has the characteristic spine on the inferomarginals, which is so conspicuous even in very young specimens of Stellaster. And finally, neither has the arched disc and slender pointed rays characteristic of Stellaster. Superficially the two species are much like *Goniodiscus forficulatus*, Perrier, but in that species (whose generic position, by the way, is quite uncertain) the medioradial plates do not reach the terminal plate of the arm, the papulæ are not surrounded by enlarged granules, and the adambulacral armature is in three parallel series, and has no conspicuous actinal spine.

Specific diagnosis : Body markedly stellate, flattened. R = 33 mm., r = 14 mm., and Br. (at base of arm) = 15 mm. R = 2·4 r. Abactinal plates granulated, but the outlines of the separate plates plainly visible. Proximal medioradial plates and some interradial plates, each with a more or less conspicuous tubercle ; altogether there are about fifty such tubercles on the holotype, the largest being on the fourth and fifth medioradial plates. Many plates which lack a tubercle have three or four central granules noticeably enlarged. Granules around the papular pores distinctly larger than those on the neighbouring plates. Superomarginal plates, 11 on each side of each ray, decreasing steadily in size distally, but becoming more and more swollen ; central granules of each

plate much larger than elsewhere on abactinal surface ; distally one (sometimes two or three) becomes evidently larger than the others, and may even become a low tubercle. Terminal plate smaller than penultimate superomarginal, bearing three distinct tubercles distally. Inferomarginal plates correspond in number and position with superomarginals ; proximally they are uniformly granulated, but distally a group of granules on the upper distal part of each plate becomes conspicuous, and one of these tends to develop into a distinct tubercle. Actinal interradial areas small ; actinal intermediate plates only extend outwards as far as fifth inferomarginal : these plates are uniformly granulated, with here and there, generally near the adambulacral plates, low foraminate or bivalved pedicellariæ. Adambulacral armature made up of an inner series of 4–6 rather stout blunt spines, the middle ones the largest, and an outer series (on actinal surface of plate) of one or rarely two flattened blunt ovate spines ; if two are present, one is much smaller than the other, and commonly this smaller spine is replaced by a pedicellaria ; these ovate actinal-adambulacral spines are much larger than any other spines on the starfish. Oral spines stout and blunt, but not peculiar. Colour of dried specimen uniformly pale brown, not at all distinctive. Holotype from Ceylon without data.

This species is readily distinguished from *squamulosus* by the coarse granules of the superomarginal plates and the presence of abactinal tubercles ; actinally the adambulacral armature is distinguishably different. There is no other species known to me with which it needs comparison.

17. *Siraster squamulosus* (Studer).—Three large (R=30 mm.) and well-preserved specimens prove Koehler is right in maintaining the validity of this species. But, as already stated, it does not seem to me proper to retain it in Stellaster.

18. *Anthenea pentagonula* (Lam'k.).—Three small specimens of Anthenea agree well with specimens of the same size from Hong Kong, identified by Perrier as

pentagonula. I am not satisfied that *tuberculosa*, Gray, from tropical Australia, is really specifically distinct. I have not yet found any tangible, constant differences.

19. *Anthenea rudis*, Koehler.—Two small but well-marked specimens give support to the validity of this recently described form.

20. *Oreaster linckii* (Bl.).—Two characteristic specimens.

21. *Oreaster mammillatus* (Aud.).—The series of sixteen specimens shows considerable variation in the details of the tuberculation. One specimen is almost exactly like the type of *O. affinis*, M. & T. (figured by Koehler, 1910), and I have no doubt that *affinis* is a synonym of *mammillatus*.

22. *Culcita schmideliana* (Retz.).—Two specimens ; neither is perfectly typical, but there is little doubt of the identity.

23. *Linckia lævigata* (L.).—Two specimens.

24. *Echinaster eridanella*, M. & T.—Ten specimens, with five rays each. The absence of six- and seven-rayed specimens suggests that this is a selected series.

25. *Metrodira subulata*, Gray.—Five specimens ; at least two have shorter and stouter rays than usual.

26. *Ophioplocus imbricatus* (M. & T.).—One specimen.

27. *Ophiarachnella marmorata* (Lyman).—Seven specimens, 12–19 mm. across the disc. I believe that this species must be maintained as distinct from *gorgonia*, although it may be only a variety of the latter.

28. *Ophiolepis superba*, nom. nov. (= *Ophiura annulosa*, Bl. NON Lamarck).—One remarkable specimen, 22 mm. across the disc, uniformly deep buff, with *no* dark markings. It is curious that it has not previously been noted that de Blainville's name *annulosa* was preoccupied and is hence untenable. Both *Ophiura annulosa*, Lamarck, and *O. annulosa*, de Blainville, have been in constant use for many years, each being a conspicuous and well-known East Indian species.

29. *Ophiactis savignyi*, M. & T.—Seventy-eight specimens, mostly very young.
30. *Ophiothrix longipeda* (Lam'k.).—One small specimen.
31. *Ophiothrix exigua*, Lyman.—One small specimen.
32. *Ophiothrix nereidina* (Lam'k.).—Four specimens ; one is remarkable for its large size, the disc being 18 mm. across ; a second is notable for its colouration, the yellow (*red* in life) greatly predominating over the blue.
33. *Ophiocnemis marmorata* (Lam'k.).—One specimen.
34. *Phyllacanthus imperialis* (Lam'k.).—Two specimens.
35. *Prionocidaris baculosa* (Lam'k.).—One young specimen ; test 28 mm. in diameter ; primary spines handsomely banded with purplish-red and pale greenish-yellow.
36. *Echinothrix diadema* (L.).—One young specimen ; test about 45 mm. in diameter. The colouration of this specimen is entirely different from that of any other individual of the species I have ever seen. The test is yellowish ; ambulacral primaries *unbanded* yellow-green ; interambulacral primaries dull reddish-purple, with or without pale yellow-green bands. The large pedicellariæ and the character of the large primary spines show that this specimen is *diadema* rather than *calamaria*, but it is possibly representative of an undescribed species or a hybrid.
37. *Centrechinus savignyi* (Mich.).—Two specimens, 4 and 40 mm. in diameter. Both are remarkable for very light colouration. Test dull yellowish, with no black ; spines banded red or purplish-red and whitish or pale yellowish. The pedicellariæ of the larger specimen are like those of *savignyi*, and there are faint lines on the upper interambulacral plates which may represent the characteristic *blue* lines of that species.
38. *Stomopneustes variolaris* (Lam'k.).—Two specimens.
39. *Toxopneustes pileolus* (Lam'k.).—Two specimens.

40. *Tripneustes gratilla* (L.).—Two specimens.
41. *Temnopleurus toreumaticus* (Leske).—One specimen.
42. *Gymnechinus robillardi* (De Lor.).—One fine specimen, 28 mm. in diameter.
43. *Salmacis bicolor*, Agass.—Six fine specimens.
44. *Salmacis virgulata*, Agass. & Des.—Fourteen specimens.
45. *Pseudoboletia maculata*, Trosch.—Four specimens. Although these individuals have the conspicuous dark blotches of *maculata*, the buccal plates are large and close together, as is supposed to be characteristic of *indiana*. Probably the two species are not distinct.
46. *Echinostrephus molare* (Bl.).—One specimen.
47. *Echinometra mathæi* (Bl.).—One small green specimen.
48. *Clypeaster humilis* (Leske).—Seven specimens.
49. *Laganum depressum*, Agass.—Two specimens.
50. *Fibularia volva*, Agass. & Des.—One bare test, remarkable for the size and form of the ambulacral pores. These are not only conspicuously large, but are distinctly triangular in outline instead of circular. This is particularly true of those in the outer part of the posterior petals. There are altogether more than 70 such pores. The specimen was found in the stomach of a large starfish, *Luidia maculata*, M. & T.
51. *Echinodiscus auritus*, Leske.—Seven specimens.
52. *Echinolampas alexandri*, De Lor.—Six specimens.
53. *Echinolampas ovata* (Leske).—Four specimens.
54. *Lovenia elongata* (Gray).—Nineteen specimens, mostly young.
55. *Pseudomaretia alta* (A. Ag.).—Three specimens. I think there is no doubt Koehler is right in separating this species from Maretia. The difficulty with the "Challenger" report figures, to which De Loriol, De Meijere, and Koehler refer, is due to the fact that the specimen there figured is not *Maretia alta*, but appears to be quite a distinct, though superficially very similar, species. This statement is based on a

comparison of one of the "Challenger" specimens in the M. C. Z. collection with one of Agassiz's original types from Kagoshima Bay. The Ceylon specimens before me are notable for their large size; one is 42 mm. long. They are clearly the same species, however, as the individual from Kagoshima.

Littoral Echinoderms of Ceylon, excepting Holothurians.

In the following list I give in connection with each name a reference to a standard work,* where synonymy and other details may be found. Some of the species listed by Bell, Döderlein, or later writers appear here under other names. A very few are omitted, as I am convinced the supposed records are based on incorrect identifications. It should be borne in mind that this is a list of species actually recorded from Ceylon. No doubt there are many others living in the shallow water about the Island which have not yet been seen by a zoologist. Some of these are already recorded from the Indian shores of the Gulf of Mannar. Particularly the comatulids and brittle-stars will prove to be as yet imperfectly known. Of the latter class, there are probably twice as many living in Ceylon waters as are here listed. The chief purpose of this compilation is to serve as a basis for further investigation.

Feather-stars (*Comatulid Crinoids*).

1. Comatella stelligera (P. H. C.). A. H. Clark, 1912, p. 68.
2. Capillaster multiradiata (L.). A. H. Clark, 1912, p. 74.
3. ———— sentosa (P. H. C.). A. H. Clark, 1912, p. 73.
4. Comatula pectinata (L.). A. H. Clark, 1912, p. 80.
5. Comanthus annulatum (Bell). A. H. Clark, 1912, p. 96.
6. ———— parvicirrum (J. Müller). A. H. Clark, 1912, p. 97.

* See "Literature List" at end of Paper.

7. Comanthus samoanum, A. H. C. A. H. Clark, 1912, p. 95.
8. ———— schlegelii (P. H. C.). A. H. Clark, 1912, p. 91.
9. Amphimetra milberti (J. Müller). A. H. Clark, 1912, p. 111.
10. Heterometra bengalensis (Hartl.). A. H. Clark, 1912, p. 130.
11. ———— reynaudii (J. Müller). A. H. Clark, 1912, p. 121.
12. Stephanometra indica (Smith). A. H. Clark, 1912, p. 135.
13. ———— marginata (P. H. C.). A. H. Clark, 1912, p. 135.
14. ———— monacantha (Hartl.). A. H. Clark, 1912, p. 136.
15. ———— tenuipinna (Hartl.). A. H. Clark, 1912, p. 135.
16. Dichrometra palmata (J. Müller). A. H. Clark, 1912, p. 148.
17. ———— protecta (Ltk.). A. H. Clark, 1912, p. 143.
18. ———— tenera (Hartl.). A. H. Clark, 1912, p. 148.
19. Cenometra herdmani, A. H. C. A. H. Clark, 1912, p. 154.
20. Decametra taprobanes (A. H. C.). A. H. Clark, 1912, p. 159.
21. Colobometra discolor, A. H. C. A. H. Clark, 1912, p. 166.
22. Oligometra serripinna (P. H. C.). A. H. Clark, 1912, p. 169.
23. Tropiometra encrinus, A. H. C. A. H. Clark, 1912, p. 177.
24. ———— indica, A. H. C. See *ante*, p. 85.
25. Mastigometra micropoda, A. H. C. A. H. Clark, 1912, p. 227.

STARFISHES (*Asteroids*).

26. *1.* Astropecten andersoni, Sladen. Koehler, 1910, p. 24.
27. *2.* ——— hemprichii, M. & T. De Loriol, 1885, p. 74.
28. *3.* ——— indicus, Död. Koehler, 1910, p. 27.
29. *4.* ——— mauritianus, Gray. Koehler, 1910, p. 32.
30. *5.* ——— petalodeus (Retz.). Lütken, 1871, p. 231 (under the name A. euryacanthus).
31. *6.* ——— polyacanthus, M. & T. De Loriol, 1885, p. 76.
32. *7.* ——— tamilicus, Död. Koehler, 1910 p. 32.
33. *8.* ——— velitaris, v. Mart. Döderlein, 1896, p. 307.
34. *9.* ——— zebra, Sladen. Sladen, 1889, p. 212.
35. *10.* Luidia hardwickii (Gray). Perrier, 1875–76, p. 147 (331 in reprint).
36. *11.* ——— maculata, M. & T. Perrier, 1875–76, p. 154 (338 in reprint).
37. *12.* Stellaster incei, Gray. Sladen, 1889, p. 322.
38. *13.* Siraster squamulosus (Studer). Koehler, 1910, p. 81.
39. *14.* ——— tuberculatus, H. L. C. See *ante*, p. 86.
40. *15.* Asterope carinifera (Lam'k.). De Loriol, 1885, p. 67.
41. *16.* Anthenea pentagonula (Lam'k.). Perrier, 1875–76, p. 90 (274 in reprint).
42. *17.* ——— rudis, Koch. Koehler, 1910, p. 86.
43. *18.* Oreaster lincki (De Bl.). Bell, 1884, p. 72.
44. *19.* ——— mammillatus (Aud.). Bell, 1884, p. 67.
45. *20.* ——— nodosus (L.). Bell, 1884, p. 70.
46. *21.* ——— thurstoni (Bell). Bell, 1888, p. 385.

47. *22.* Culcita schmideliana (Retz.). De Loriol, 1885, p. 64. Döderlein, 1896, p. 315.
48. *23.* Asterina cepheus (M. & T.). De Loriol, 1885, p. 69.
49. *24.* ——— lorioli, Koeh. Koehler, 1910, p. 129.
50. *25.* Disasterina ceylanica, Död. Döderlein, 1888, p. 825.
51. *26.* Anseropoda sarasini (De Lor.). Koehler, 1910, p. 127.
52. *27.* Linckia guildingii, Gray (= pacifica, Gray). Perrier, 1875–76, p. 408 (144 in reprint).
53. *28.* ——— lævigata (L.). De Loriol, 1885, p. 36 (under name miliaris).
54. *29.* Ophidiaster cylindricus (Lam'k.). De Loriol, 1885, p. 20.
55. *30.* ——— ornatus, Koeh. Koehler, 1910, p. 151.
56. *31.* Nardoa ægyptiaca (Gray). Koehler, 1910, p. 157.
57. *32.* ——— novæ-caledoniæ (Perr.). Perrier, 1875–76, p. 426 (162 in reprint).
58. *33.* ——— tuberculata, Gray. Perrier, 1875–76, p. 421 (157 in reprint).
59. *34.* ——— variolata (Retz.). Perrier, 1875–76, p. 423 (159 in reprint).
60. *35.* Fromia milleporella (Lam'k.). De Loriol, 1885, p. 44.
61. *36.* ——— tumida, Bell. Bell, 1882, p. 124.
62. *37.* Ferdina offreti, Koeh. Koehler, 1910, p. 143.
63. *38.* Retaster cribrosus (v. Mart.). Perrier, 1875–76, p. 199 (383 in reprint).
64. *39.* Acanthaster planci (L.). Döderlein, 1896, p. 320. De Loriol, 1885, p. 6 (under the name A. mauritiensis).

65. *40.* Echinaster purpureus (Gray). De Loriol, 1885, p. 10.
66. *41.* Metrodira subulata, Gray. Koehler, 1910, p. 172.

BRITTLE-STARS (*Ophiurans*).

67. *1.* Pectinura arenosa, Lyman. Lyman, 1882, p. 15.
68. *2.* ——— fallax (Peters). De Loriol, 1894, p. 4.
69. *3.* Ophiarachnella gorgonia (M. & T.). H. L. Clark, 1909, p. 123.
70. *4.* ——— marmorata (Lym.). Lyman, 1874, p. 222.
71. *5.* ——— septemspinosa (M. & T.). De Loriol, 1893, p. 395.
72. *6.* Ophiarachna incrassata (Lam'k.). H. L. Clark, 1909, p. 127.
73. *7.* Ophiolepis cincta, M. & T. De Loriol, 1894, p. 9.
74. *8.* ——— rugosa, Koeh. Koehler, 1898, p. 64.
75. *9.* ——— superba, H. L. C. (See *ante*, p. 89.) De Loriol, 1894, p. 10.
76. *10.* Ophioplocus imbricatus (M. & T.). De Loriol, 1894, p. 12.
77. *11.* Ophiura kinbergi (Lym.). Lyman, 1882, p. 38.
78. *12.* Ophiactis savignyi (M. & T.). Koehler, 1905, p. 26.
79. *13.* Amphiura duncani, Lym. Koehler, 1905, p. 33.
80. *14.* Ophiocnida sexradia, Dunc. Koehler, 1905, p. 33.
81. *15.* Ophionereis porrecta, Lym. Koehler, 1898, p. 74.
82. *16.* Ophiocoma brevipes, Peters. De Loriol, 1894, p. 25.
83. *17.* ——— erinaceus, M. & T. De Loriol, 1894, p. 21.
84. *18.* ——— pica, M. & T. De Loriol, 1894, p. 28 (under the name lineolata).
85. *19.* ——— scolopendrina (Lam'k.). De Loriol, 1894, p. 23.
86. *20.* Ophiarthrum elegans, Peters. Koehler, 1898, p. 108.

87. *21.* Ophiomastix annulosa (Lam'k.). Lyman, 1882, p. 174.
88. *22.* Ophiacantha decora, Koeh. Koehler, 1898, p. 80.
89. *23.* Ophiocnemis marmorata (Lam'k.). Döderlein, 1888, p. 833.
90. *24.* Ophiomaza cacaotica, Lym. Koehler, 1898, p. 84.
91. *25.* Ophiothela holdsworthii, E. A. Smith. E. A. Smith, 1878, p. 464.
92. *26.* Ophiopteron elegans, Ludw. Koehler, 1905, p. 112.
93. *27.* Ophiothrix aspidota, M. & T. Koehler, 1904, p. 87.
94. *28.* ———— ciliaris (Lam'k.). Koehler, 1904, p. 100.
95. *29.* ———— comata, M. & T. Koehler, 1904, p. 105.
96. *30.* ———— exigua, Lym. Lyman, 1874, p. 236.
97. *31.* ———— foveolata, Mrktr. Koehler, 1905, p. 76.
98. *32.* ———— innocens, Koeh. Koehler, 1898*a*, p. 164.
99. *33.* ———— longipeda (Lam'k.). De Loriol, 1894, p. 36.
100. *34.* ———— nereidina (Lam'k.). Döderlein, 1888, p. 832.
101. *35.* ———— punctolimbata, v. Mart. Koehler, 1905, p. 93.
102. *36.* Ophiomyxa brevispina, var. irregularis, Koeh. Koehler, 1898, p. 110.
103. *37.* Astrophyton clavatum, Lym. Lyman, 1865, p. 191.

SEA-URCHINS (*Echini or Echinoids*).

104. *1.* Eucidaris metularia (Lam'k.). H. L. Clark, 1907, p. 184.
105. *2.* Phyllacanthus imperialis (Lam'k.). H. L. Clark, 1907, p. 188.

106. *3.* Prionocidaris baculosa (Lam'k.). H. L. Clark, 1907, p. 189.

107. *4.* ———— bispinosa (Lam'k.). H. L. Clark, 1907, p. 188 (under the name Phyllacanthus annulifera).

108. *5.* Centrechinus savignyi (Mich.). A. Agassiz & H. L. Clark, 1908, pp. 112–114.

109. *6.* Centrechinus setosum (Leske). A. Agassiz & H. L. Clark, 1908, pp. 112, 113.

110. *7.* Echinothrix diadema (L.). A. Agassiz & H. L. Clark, 1908, p. 116.

111. *8.* Astropyga radiata (Leske). A. Agassiz & H. L. Clark, 1908, p. 123.

112. *9.* Asthenosoma urens, Saras. A. Agassiz & H. L. Clark, 1909, p. 172.

113. *10.* Stomopneustes variolaris (Lam'k.). A. Agassiz, 1873, p. 437.

114. *11.* Temnopleurus reevesii (Gray). H. L. Clark, 1912, pp. 312, 313.

115. *12.* ———— toreumaticus (Leske). H. L. Clark, 1912, p. 312.

116. *13.* Salmacis bicolor, Agass. H. L. Clark, 1912, p. 316.

117. *14.* ——— dussumieri, Ag. & Des. H. L. Clark, 1912, p. 316.

118. *15.* ——— virgulata, Ag. & Des. H. L. Clark, 1912, p. 316.

119. *16.* Toxopneustes pileolus (Lam'k.). H. L. Clark, 1912, p. 283.

120. *17.* Tripneustes gratilla (L.). H. L. Clark, 1912, p. 285.

121. *18.* Gymnechinus robillardi (De Lor.). H. L. Clark, 1912, p. 287.

122. *19.* Microcyphus maculatus, Agass. H. L. Clark, 1912, p. 323.

123. *20.* Pseudoboletia indiana (Mich.). H. L. Clark, 1912, p. 345.

124. *21.* Pseudoboletia maculata, Trosch. H. L. Clark, 1912, p. 345.
125. *22.* Echinostrephus molare (Bl.). H. L. Clark, 1912, p. 342.
126. *23.* Echinometra mathæi (Bl.). H. L. Clark, 1912, pp. 371, 372.
127. *24.* ———— oblonga (Bl.). H. L. Clark, 1912, pp. 372, 373.
128. *25.* Clypeaster humilis (Leske). H. L. Clark, 1914, pp. 24, 36.
129. *26.* ———— reticulatus (L.). H. L. Clark, 1914, pp. 24, 34.
130. *27.* Laganum depressum, Agass. H. L. Clark, 1914, p. 45.
131. *28.* Fibularia volva, Ag. & Des. H. L. Clark, 1914, pp. 57, 58.
132. *29.* Echinodiscus auritus, Leske. H. L. Clark, 1914, pp. 70, 71.
133. *30.* ———— bisperforatus, Leske. H. L. Clark, 1914, p. 71.
134. *31.* Echinoneus cyclostomus, Leske. De Loriol, 1883, p. 38.
135. *32.* Echinolampas alexandri, De Lor. De Loriol, 1883, p. 43.
136. *33.* ———— ovata (Leske). A. Agassiz, 1873, p. 553 (under the name oviformis). See also p. 114.
137. *34.* Schizaster gibberulus, Agass. A. Agassiz, 1873, p. 612.
138. *35.* Metalia sternalis (Lam'k.). De Loriol, 1883, p. 44.
139. *36.* Lovenia elongata, Gray. Koehler, 1914, p. 111.
140. *37.* Maretia planulata (Lam'k.). Koehler, 1914, p. 106.
141. *38.* Pseudomaretia alta (A. Ag.). Koehler, 1914, p. 107.

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